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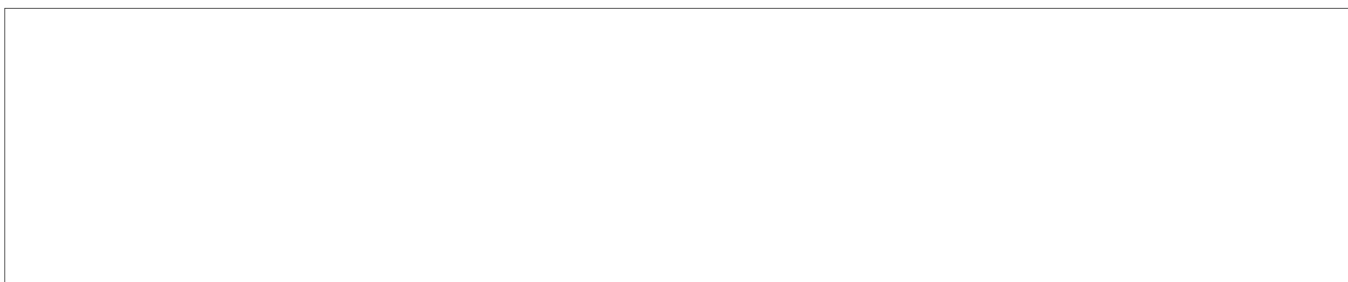


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(TUGS INSTRUCTIONS FOR SMALL BOATS)
PHYSICAL-REVIEW INSTRUCTIONS

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Timer Instructions

I. Description

The release escapement is a gravity powered clock mechanism designed to release a small balloon payload at a predetermined time. The escapement consists of a clock mechanism mounted inside a plastic housing. See figures 1A and 1B. Mounted on the clock shaft is an aluminum spindle. A 100 lb. test nylon cord with a loop on one end is wound on this spindle. The loop is hooked in the inner slot of the spindle (see figure 2) and wound in a counterclockwise direction, with one complete turn put on for each hour duration desired. Figure 3 shows the spindle wound for a $\frac{1}{3}$ hour duration. (Arrow shows drop-off point.)

The clock mechanism has a slip clutch so that the spindle may be turned manually at any time. At the outer end of the spindle a slot is cut for convenience in turning the spindle manually. See figure 4. This is used for adjusting or setting a predetermined time.

II. Operating Loads

The release escapement is actuated by approximately three pounds and will run with a load of approximately two pounds. The clutch will slip at twenty-five pounds. For a safety factor it is recommended that a load of not more than twelve pounds be suspended by the escapement.

III. Instructions

The escapement is supplied with an eight hour duration or eight turns of cord wound on the spindle. If a different duration is desired a screw driver may be inserted in the slot and the spindle turned one full revolution for each hour change desired. Turn the spindle clockwise one revolution for each additional hour desired and one revolution counterclockwise for each hour less than the supplied eight hour duration.

The index mark on the face of the escapement is used as a zero point when adding or subtracting revolutions for time changes.

For loads up to five pounds the escapement is accurate at one revolution per hour. On loads of five pounds and over however, the clutch will slip on the last 120° of rotation of the last revolution. Therefore, on loads of five pounds and over a correction factor must be taken into consideration. See figure 5. This is a chart showing the amount of additional time that must be wound on the clock for different loads.

For an example, let us assume a load of 10 pounds is going to be suspended from the timer and an eight hour duration is desired. We see from the chart that an additional fourteen minutes must be wound on the spindle. The spindle turns 360° in 60 minutes or 6° each minute. To add 14 minutes the spindle must be turned clockwise 84° or approximately one quarter turn from its initial setting.

It is advisable to keep a light tension on the load line at all times while working with the escapement to prevent the possibility of the line unwinding or unhooking.

When suspending the timer between the balloon and the payload the load line (wound on spindle) should be connected to the balloon if the escapement is to remain with the payload at drop-off time and the load line should be connected to the payload if the escapement is to remain with the balloon.



FIGURE 1A



FIGURE 1B



FIGURE 2

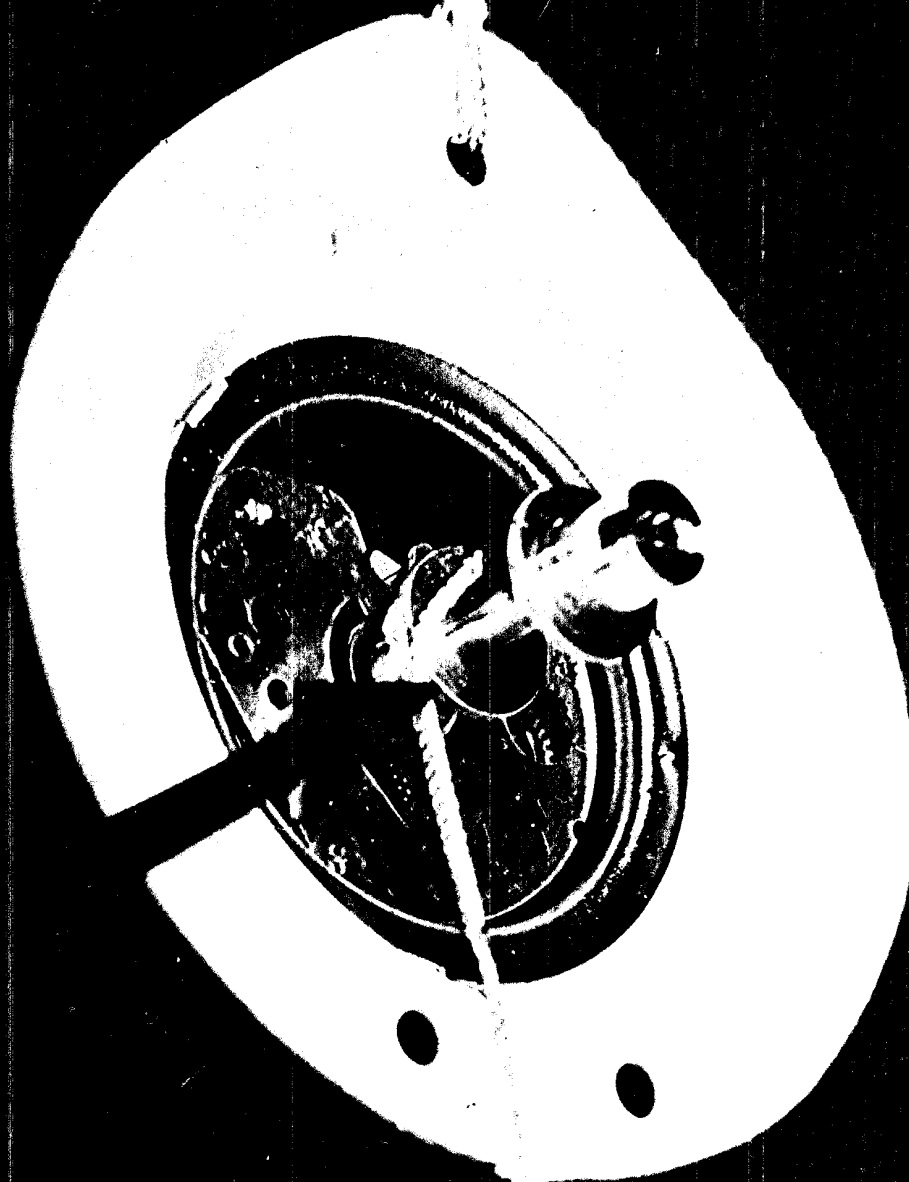


FIGURE 3

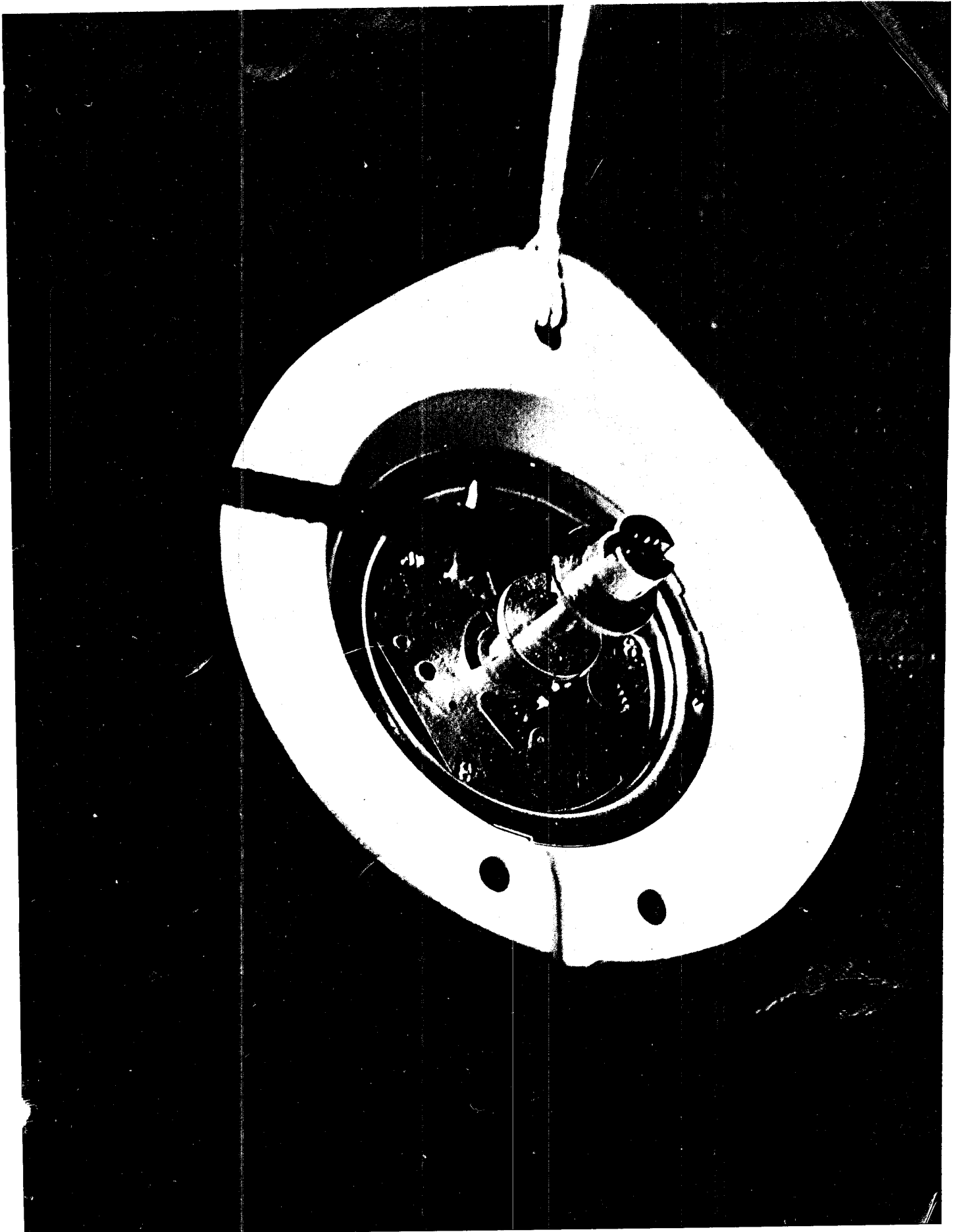


FIGURE 4

